

Outage Implementation Utility Perspective

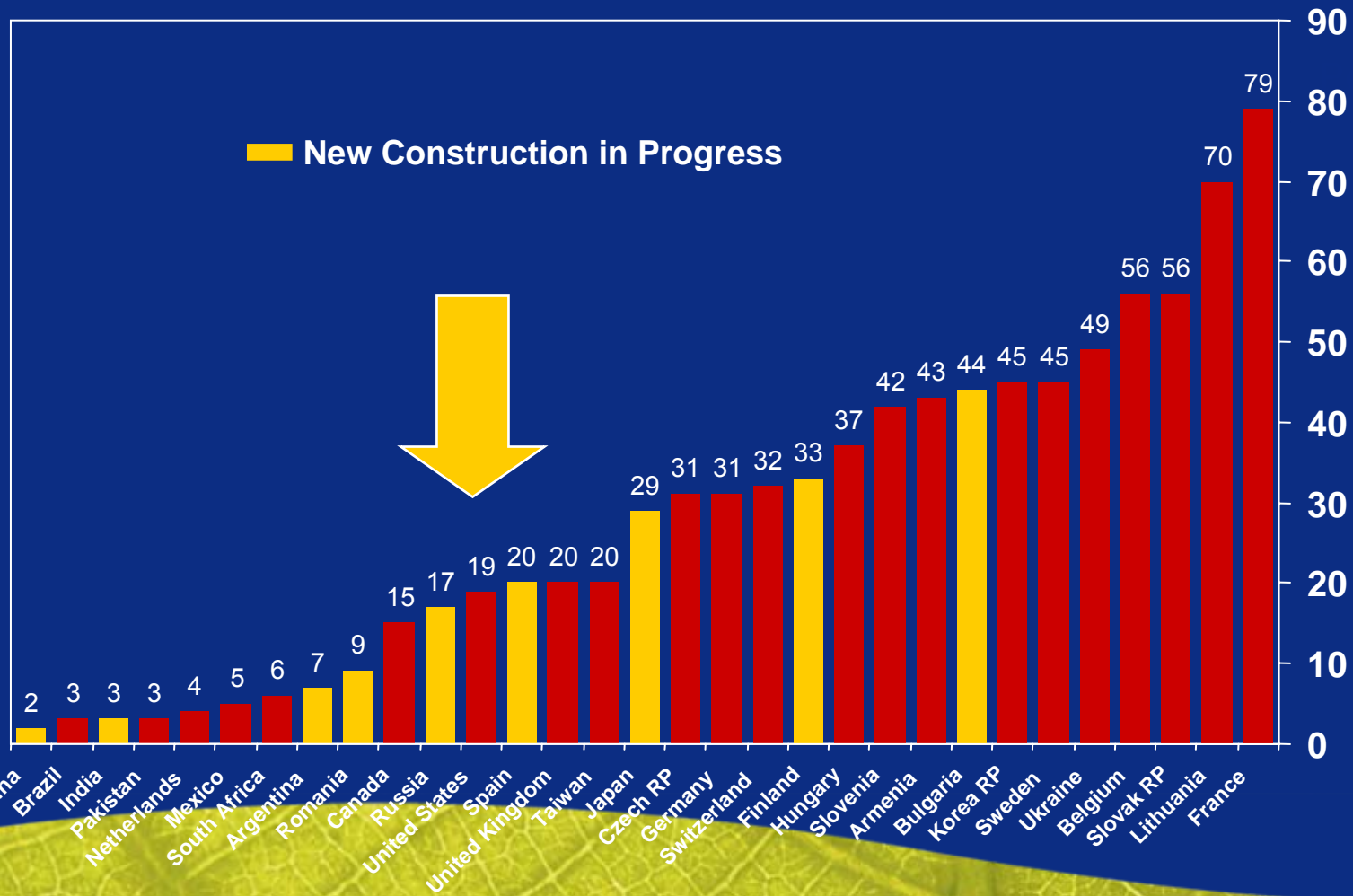
Tim Salentino, Manager

U.S. PWR Refueling & Outage Services Operations
Westinghouse Electric Company, LLC

Discussion Points

- Nuclear Plants Information – Background
- Outages – Utility Perspective
- Outage Drivers
- Outage Planning – An Example
- Questions

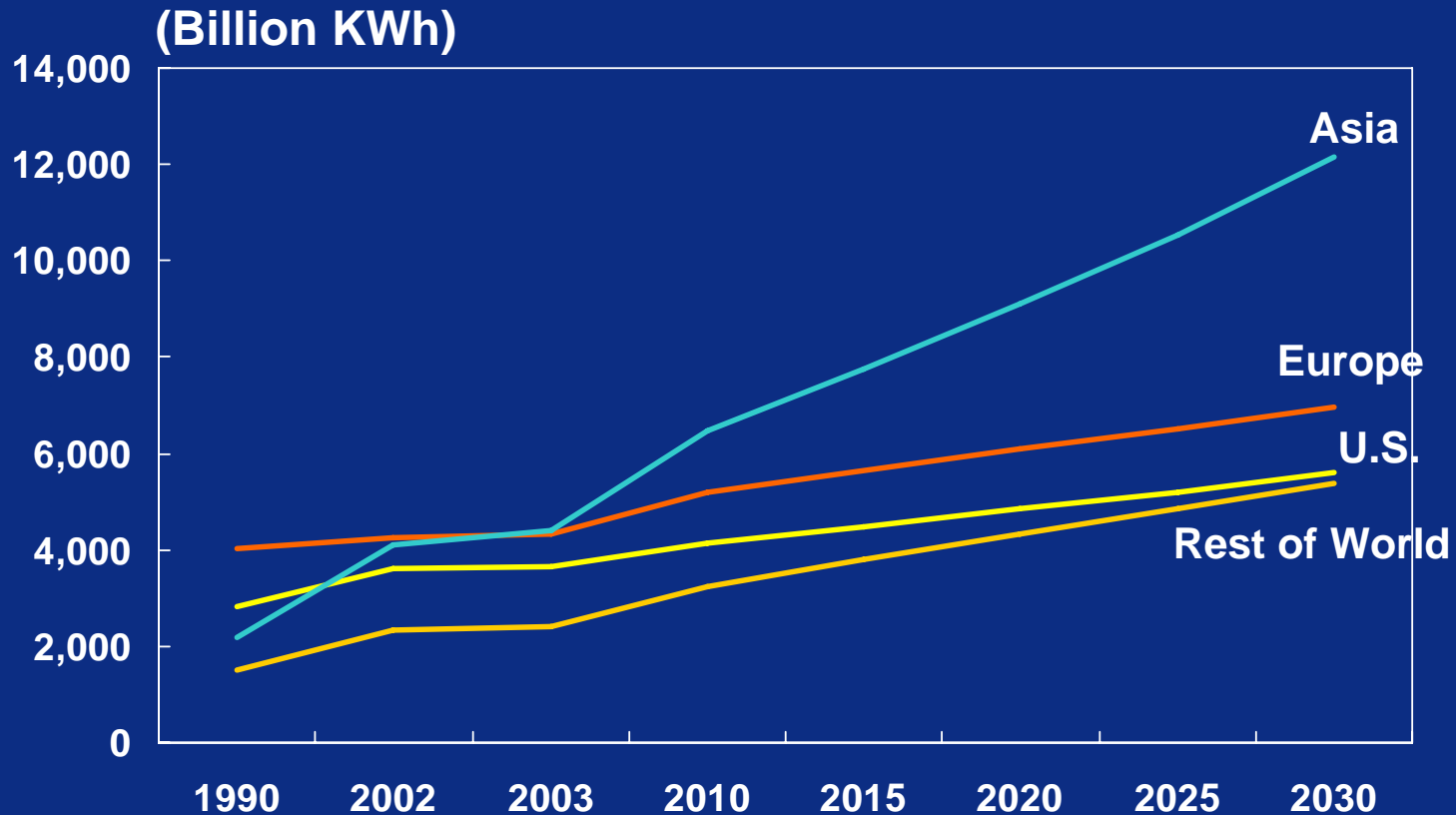
Nuclear's Global Share of Electricity Generation



Source: International Atomic Energy Agency & World Nuclear Association Database

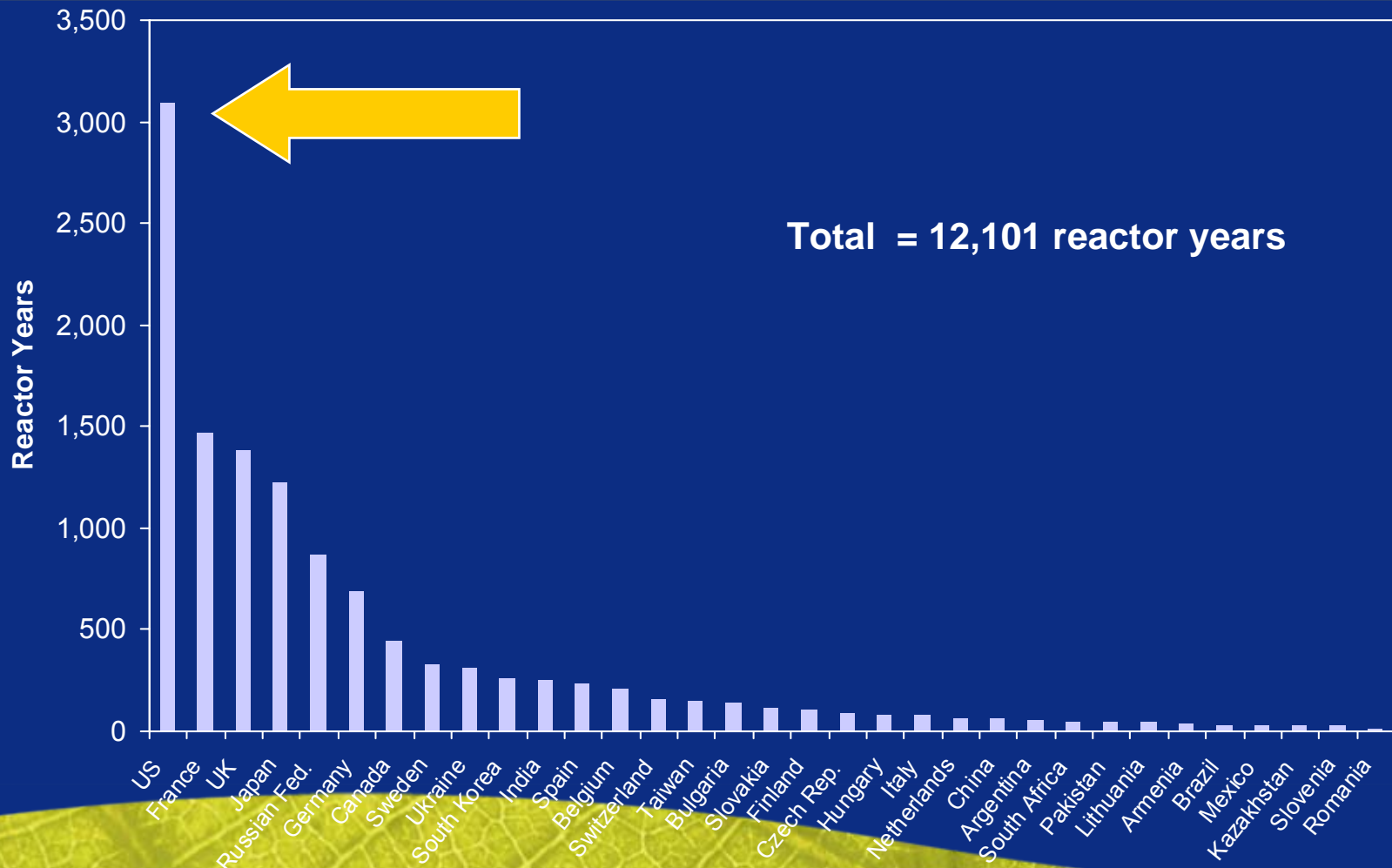


Forecast Electricity Demand



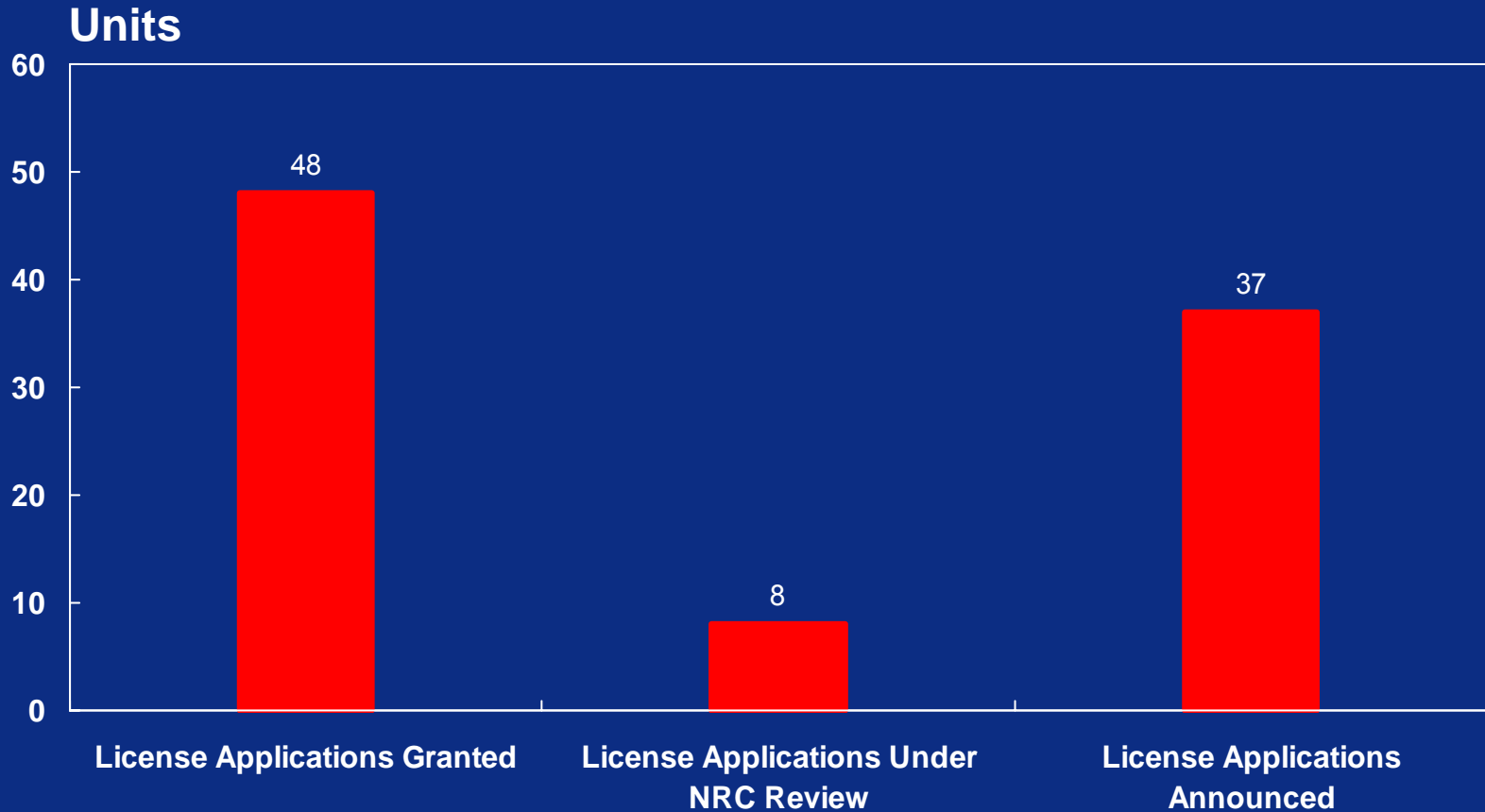
Source: EIA Annual Energy Outlook 2006

Nuclear Industry's Total Operation Experience in Reactor Years



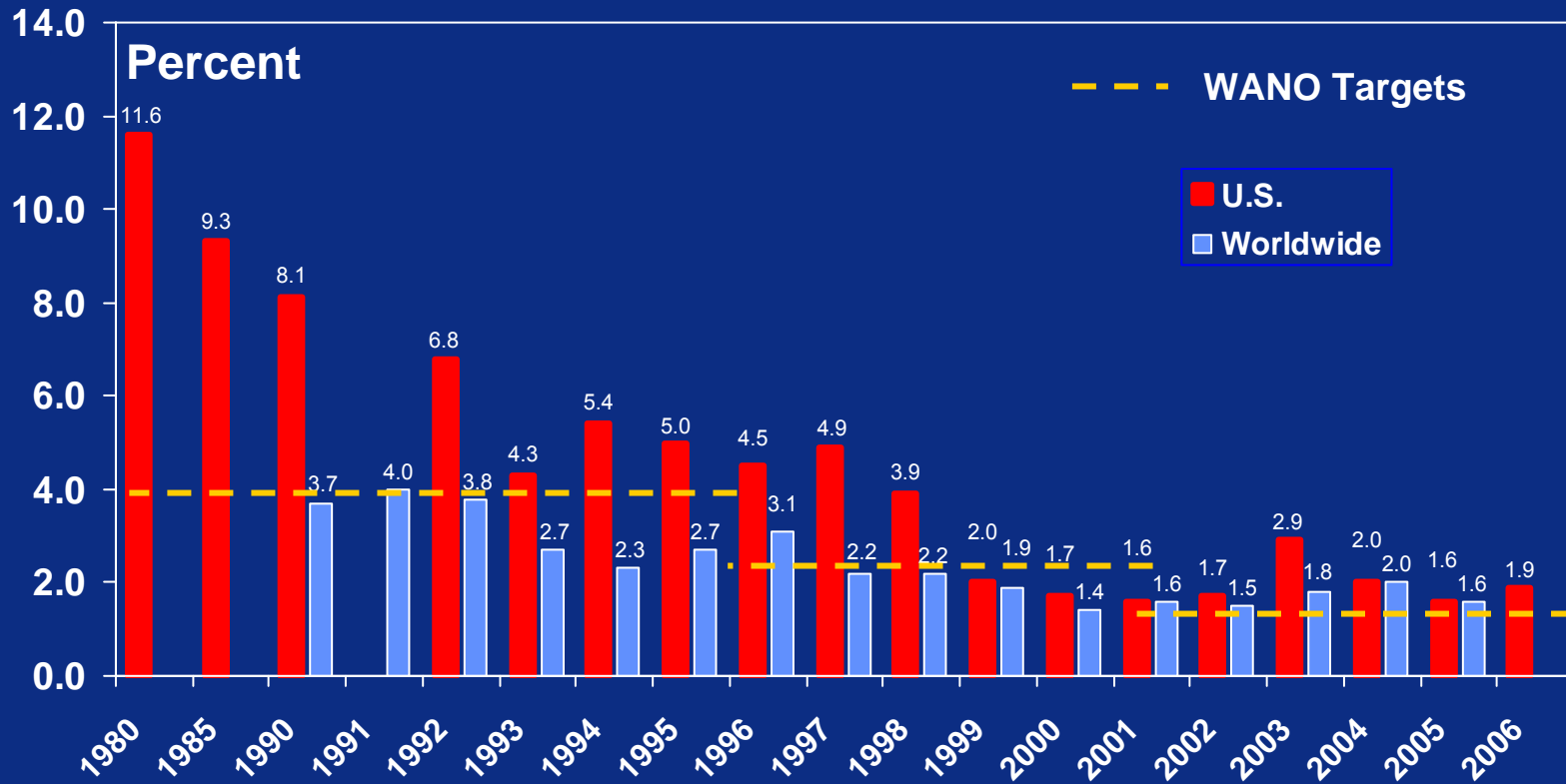
Source: IAEA 2006

Plant Applications for License Extension



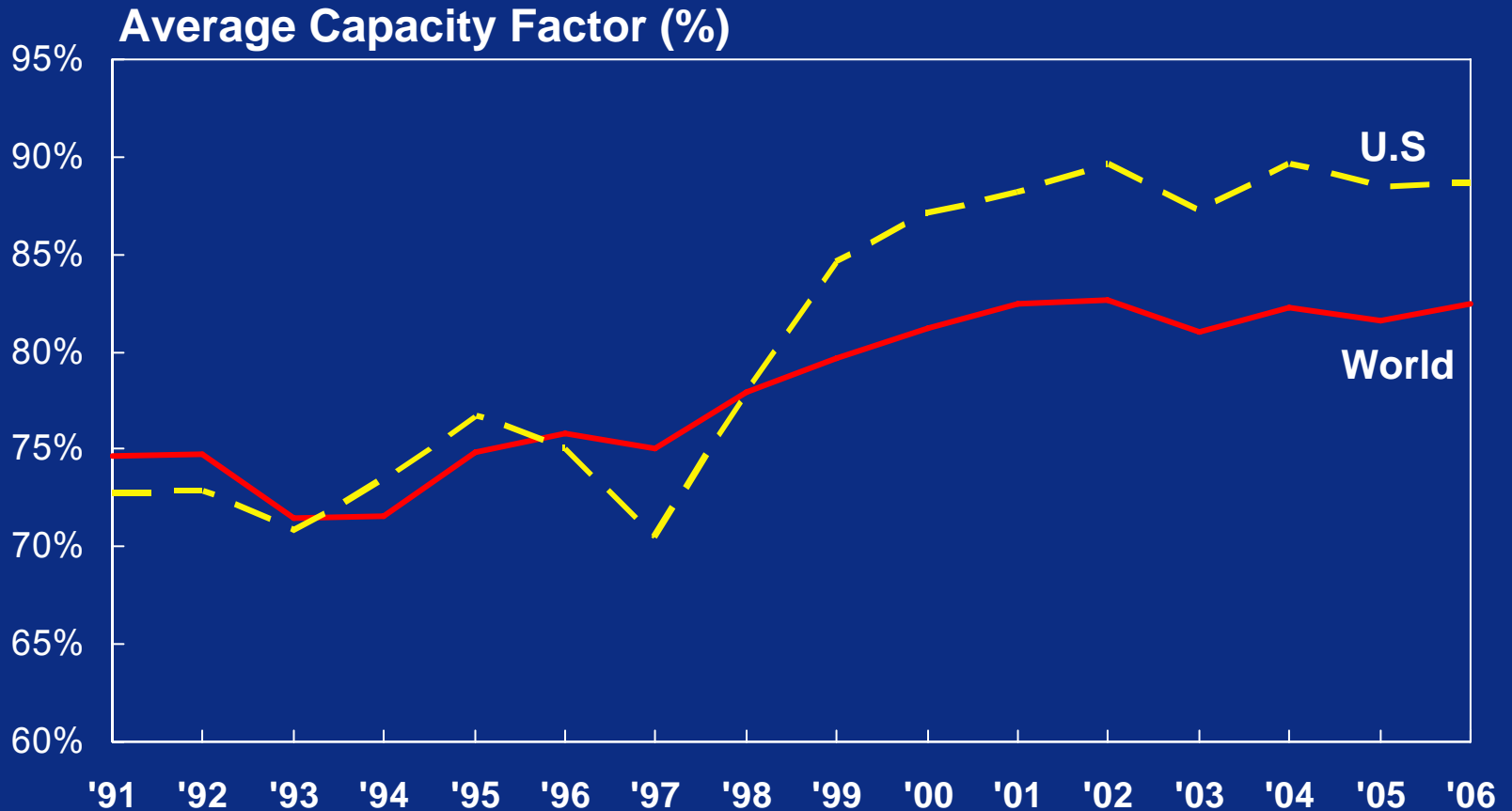
Source: NRC, May 2007

Unplanned Capability Loss Factor



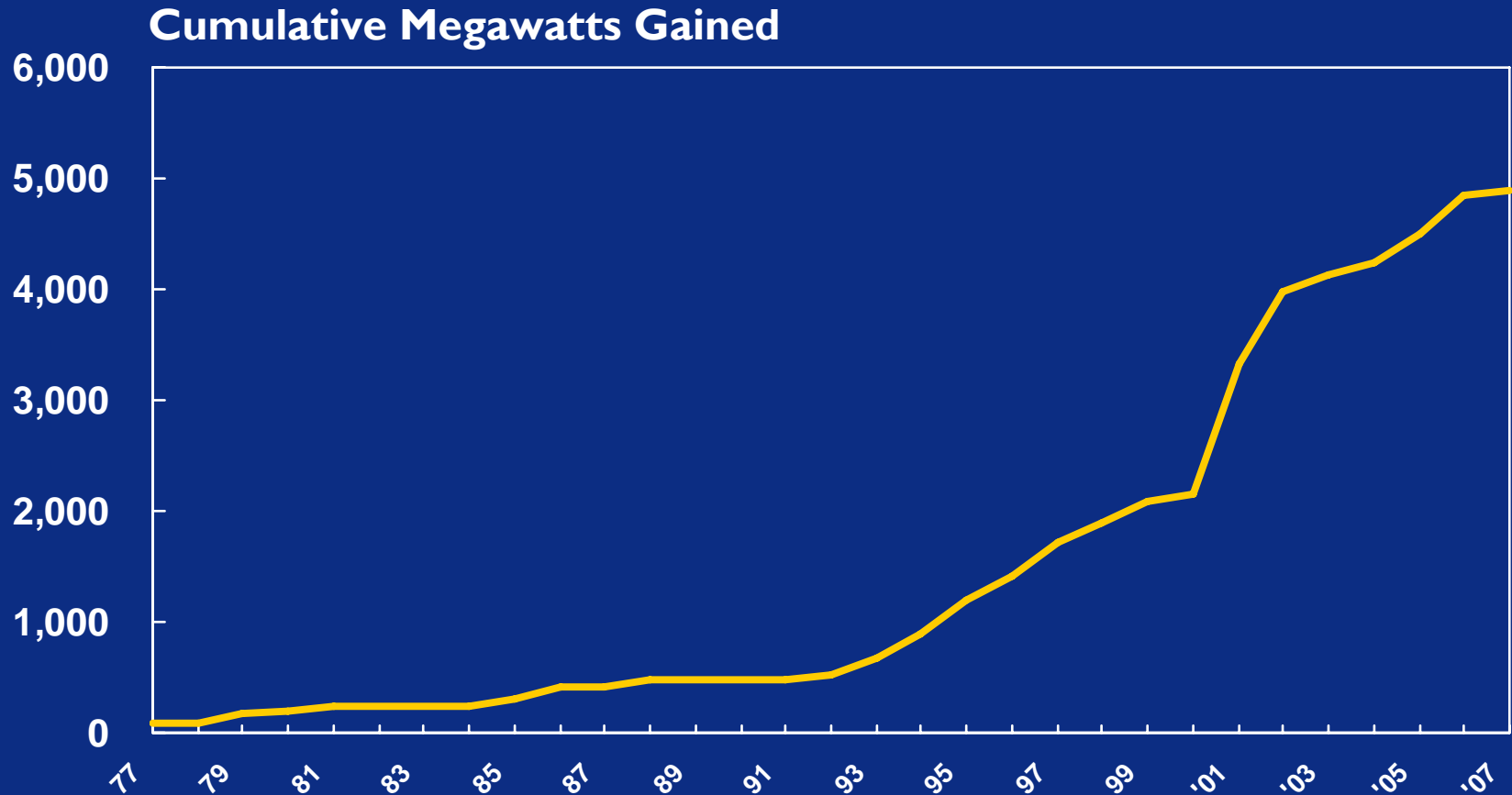
Source: WANO/INPO

Average Capacity Factor



Source: McGraw-Hill, Nucleonics Week, YTD November 2006, LWR

U.S. Nuclear Industry Power Uprates



Source: Nuclear Regulatory Commission, Updated: May 2007

Nuclear Industry Continues to Set New Records

**Nordic Region
Outage
Performance**



**FENOC
Fleet Performance**



**South Texas
Sustained
Excellence**



**South Korea
Capability**



**Vogtle
Operating Costs**



What is an Outage? Utility Point of view

- Refueling
- Steam Generator Inspections
- Steam Generator Maintenance
- In-service Inspections
- Motor & Air-operated Valves
- Snubbers
- I&C Maintenance
- Electrical Maintenance
- Mechanical Maintenance
- RPV Head and RPV Inspections
- Cooling Tower
- Turbine

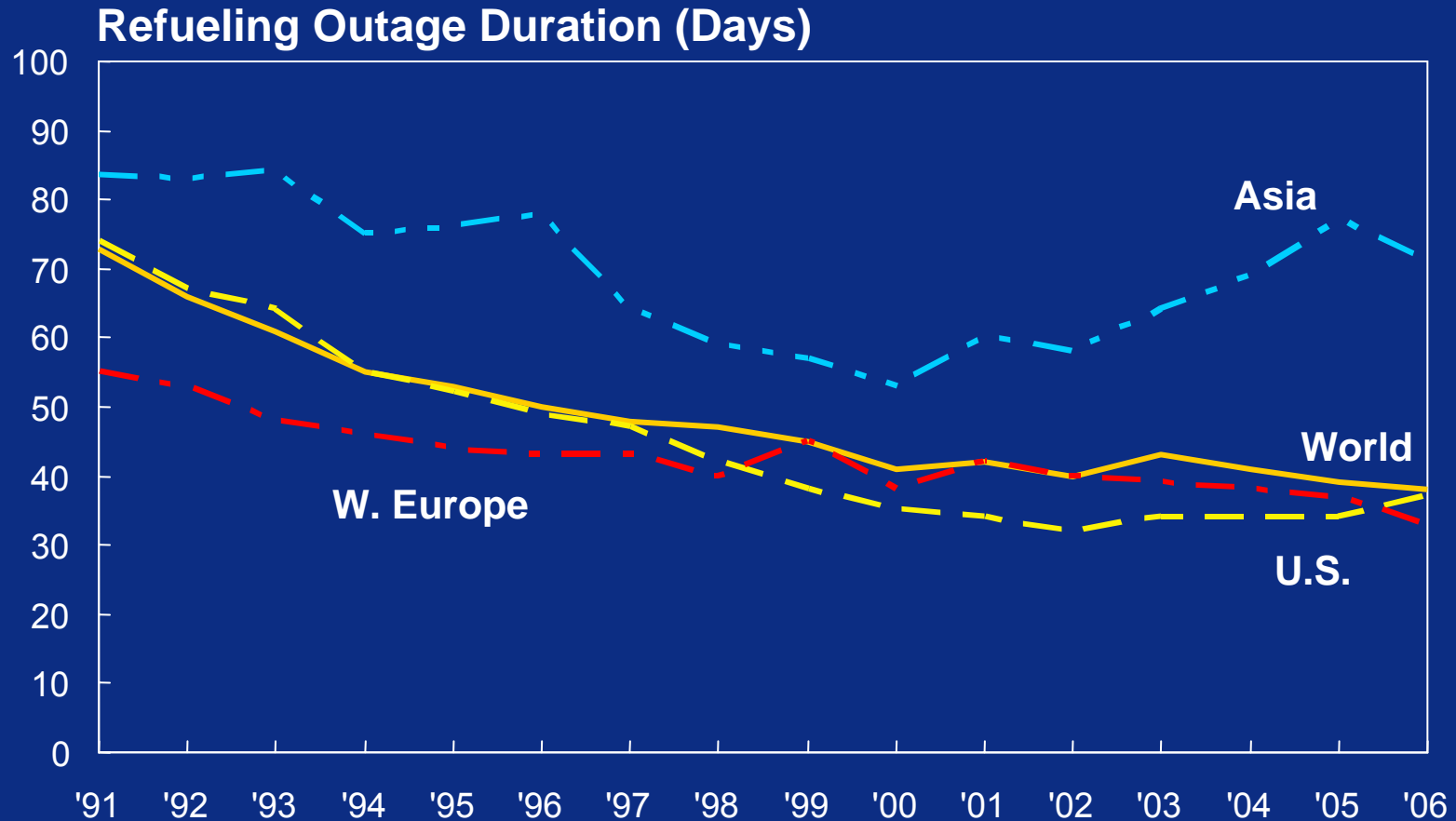


What is an Outage? Utility Point of view

- \$36 Million
- 35 Days of Work
- 1200+ Vendors of Site
- 800+ site workers in “outage mode”
- 80-150 Rem of Radiation Exposure
- \$2000/hour Replacement Power

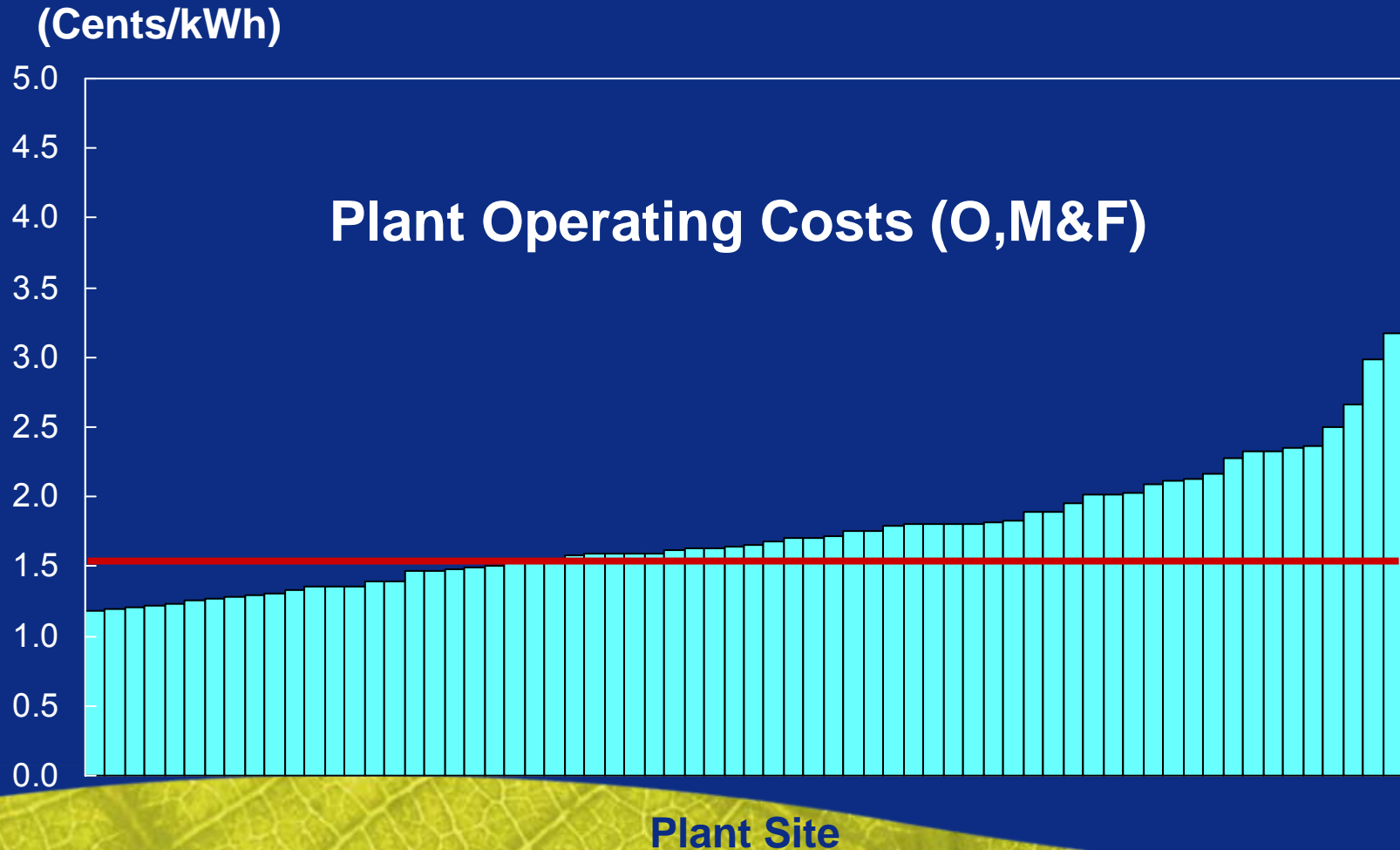
Outage Drivers

LWRs: Median Refueling Outage Duration



Source: McGraw-Hill

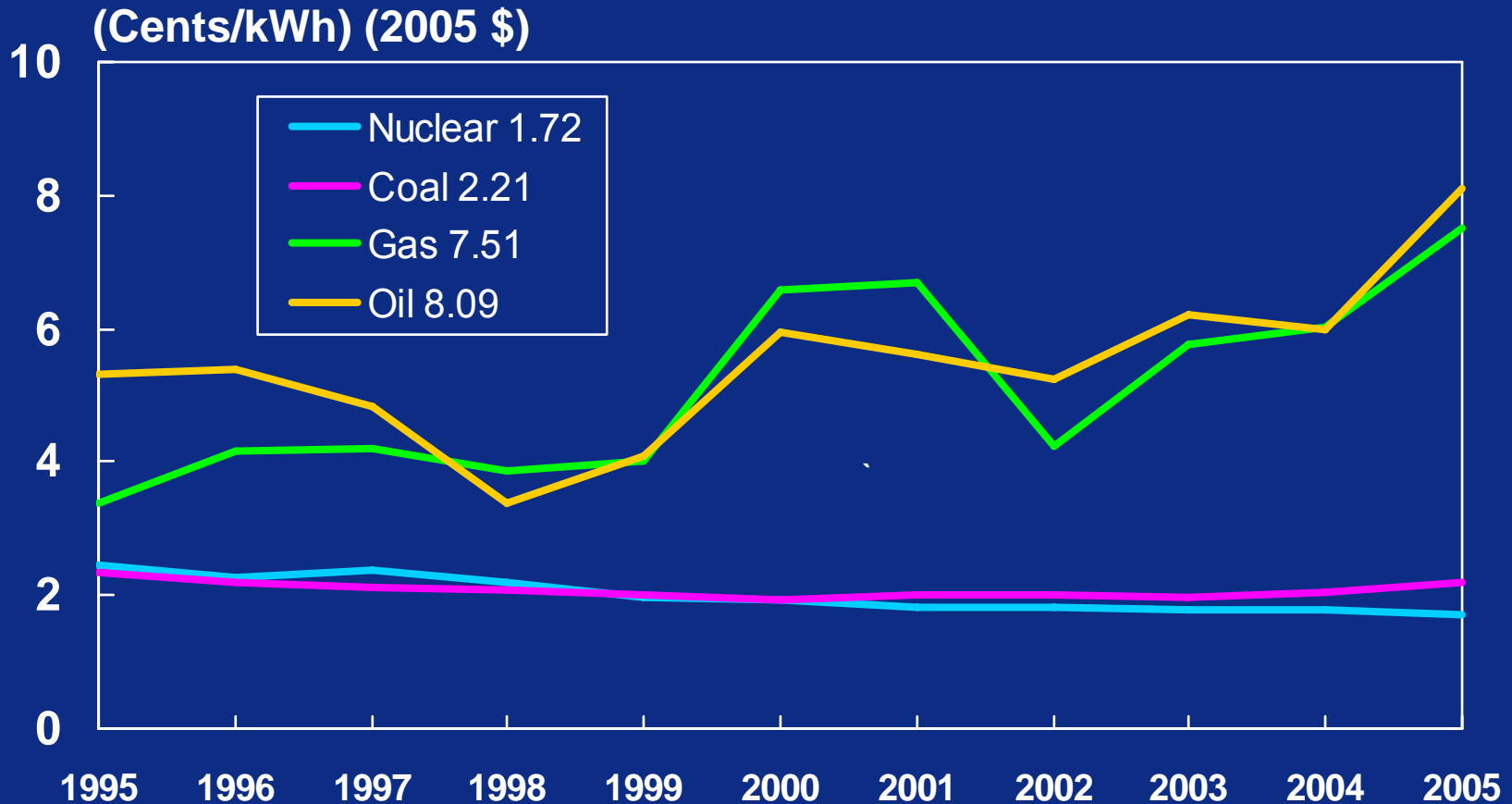
Top 35 Percent of U.S. LWRs are 1.5 ¢/kWh or Lower (3-year Average)



Source: Energy Velocity / Nucleonics Week / Individual Utility Data



U.S. Electricity Production Costs



Source: Global Energy Decisions

Nuclear Industry Safety Accident Rate (Worldwide)

Number per 200,000 man-hours worked



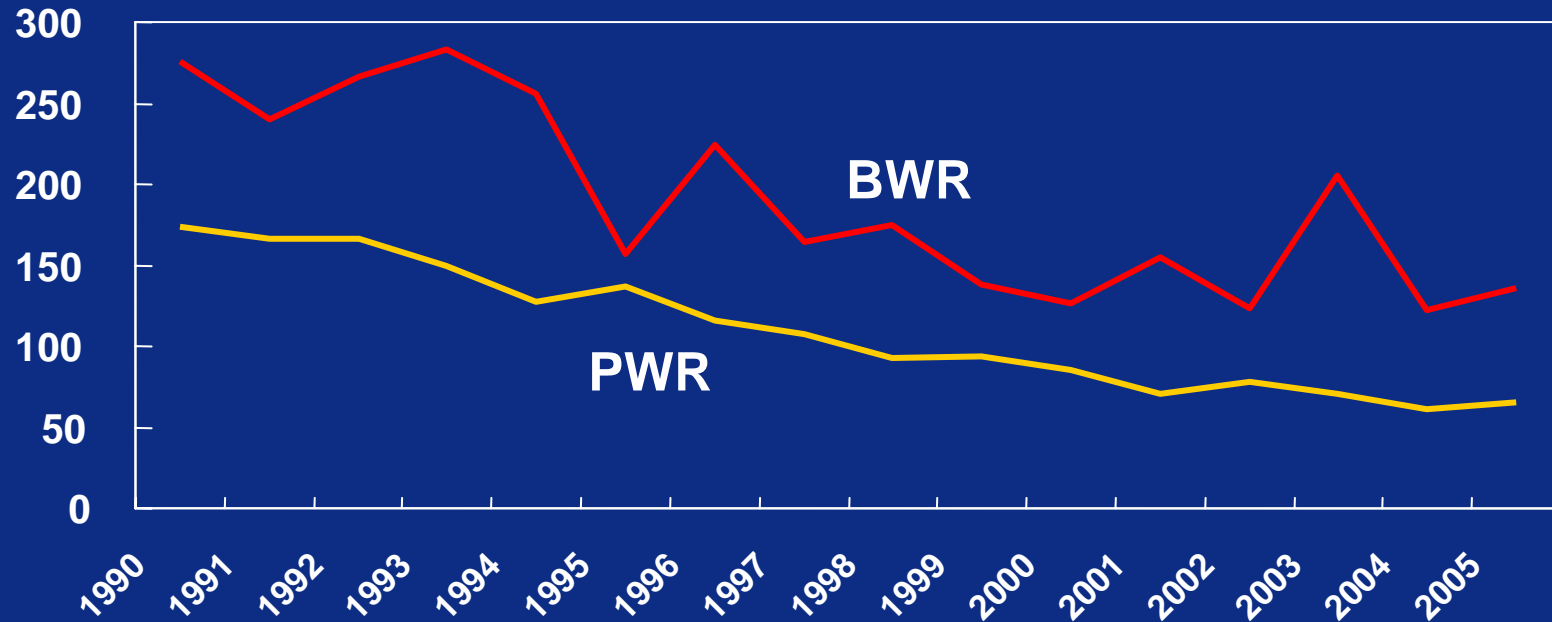
Source: WANO



Radiation Exposure Trend

Positive Overall

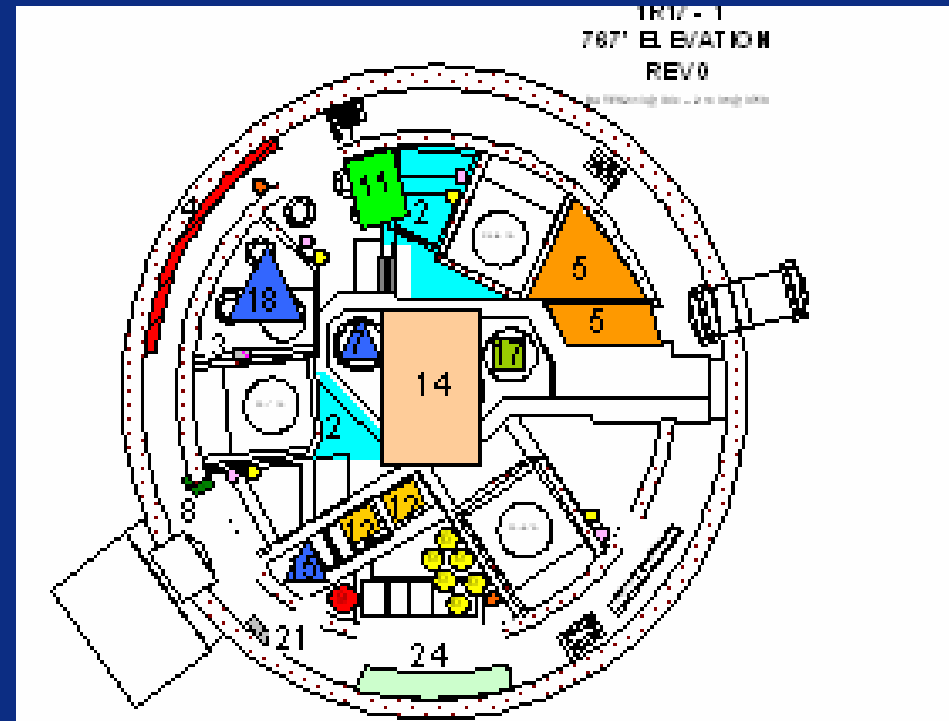
Total Dose Worldwide
(Man-rem per unit)



Source: WANO

Outage Planning – An Example

- Containment Mobilization
 - Equipment Mobilization Plan
 - Real Estate Plan (Site and Containment)
 - Containment Closeout Plan
 - Crane Prioritization / Coordination
 - Charter with Risk Mitigation
 - Formal Readiness Review
 - ALARA / Safety Oversight
 - First Aid / CPR Response



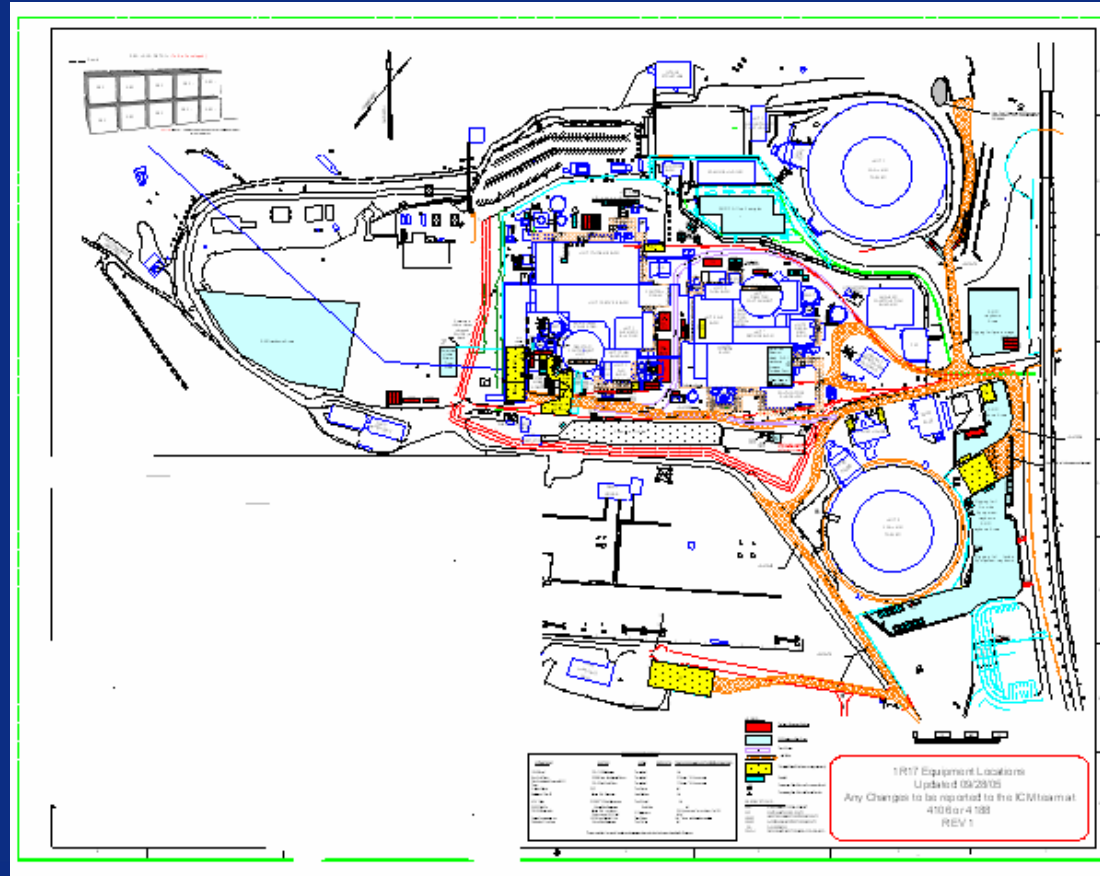
Planned 18 Months Ahead

Containment Mobilization!

- Equipment Logistics
 - 275 - 300 Tons of Equipment (typical)
 - 755 Mobile Crane Lifts
 - 900 Polar Crane Lifts
 - > 1 lift per hour.

Site Logistics

- Support Equipment
 - Cranes
 - Fork trucks
 - Compressors
 - Yard Jockeys
 - Trailers
 - Personnel
 - Offices
 - Consumables



Summary

- Nuclear Plants Information – Background
- Utility Perspective of an outage
- Outage Drivers – what drives our outages!
 - Duration
 - Costs
 - Safety / HuP / Exposure
 - Logistics
- Outage Planning – An Example

Questions ?

